

REMARKS

Claims 1, 4 – 8, and 10 – 21 are currently pending. Claims 1, 4, and 7 have been amended, claim 22 is new, and claims 2, 3, and 9 have been canceled. No new matter has been added.

CLAIM AMENDMENTS:

Claims 1, 4, and 7 have been amended, and claim 22 has been added, to recite specific ranges of sulfuric acid concentration. Support for these ranges can be found at page 3 of the original specification.

REJECTION UNDER 35 U.S.C. § 103(a):

The Office has rejected claims 1 – 8 and 10 – 21 under 35 U.S.C. § 103(a) as being unpatentable over US 5,874,658 (Belter) in view of US 5,895,639 (Swain), and optionally in view of US 5,763,706 (Tung). In particular, the Office cites Belter as teaching a method for separating hydrogen fluoride (HF) from a mixture of HF and a hydrofluorocarbon (HFC) comprising treating the mixture with an aqueous solution of sulfuric acid, wherein the concentration of sulfuric acid is solution is from about 1 – 100%. The Office further asserts that the values for the concentration of the sulfuric acid disclosed in Belter overlaps the claimed range.

Applicants respectfully point out that Belter's disclosure is directed to a method of separating HF from HFC's, whereas the present invention is directed to a method of producing anhydrous HF. In other words, Belter is not at all concerned with the amount of water in any separated HF. This distinction is important for at least the reason that

Belter's disclosed range of H_2SO_4 concentration in water does not produce an HF-sulfuric acid admixture from which anhydrous HF could be readily obtained. More specifically, Belter discloses that a dilute solution of sulfuric acid can be used as an additive to separate HF from a fluorinated aliphatic hydrocarbon and that such sulfuric acid solutions can contain from about 1 wt. % to about 100 wt. % H_2SO_4 . Belter makes no distinction with respect to any sub-range within this range and does not provide any examples of how a sulfuric acid solution of any concentration may be used in a process to produce anhydrous HF. Belter cannot provide any suggestion or motivation to make the present invention.

Furthermore, while applicants do not opine on the efficacy of the Belter method for separating HF from an HFC, they do note that *anhydrous HF* cannot be readily obtained from mixtures of HF and dilute sulfuric acid where the concentration of H_2SO_4 in water is less than about 63 weight percent. That is, if HF were extracted from a HF-HFC mixture using dilute sulfuric acid having a H_2SO_4 concentration of less than about 63 weight percent relative to water, the resulting HF- H_2SO_4 -water mixture would not yield anhydrous HF via flashing or distillation because relatively large amounts of HF will remain in the H_2SO_4 -water mixture and relatively large amounts of water will be removed along with the HF distillate.

Support for applicants' assertions can be found in S. V. Ostrovskii, et al., "Liquid-Vapor Equilibrium in the System Hydrogen Fluoride – Sulfuric Acid – Water at 22° C", *ZHURNAL PRIKLADNOI KHIMII*, Vol. 48, No. 2 (Feb. 1975) pp. 431-433 (attached). Ostrovskii describes the composition of the liquid and vapor phases of a HF- H_2SO_4 -water system, in part, as follows:

Liquid Composition				Vapor Composition	
HF (wt. %)	H ₂ SO ₄ (wt. %)	H ₂ O (wt. %)	wt. % H ₂ SO ₄ in H ₂ O [<i>added for reference</i>]	HF (mol. %)	H ₂ O (mol. %)
36.48	57.09	6.43	90	100.0	0.0
10.06	56.39	33.55	63	81.0	19.0
10.19	52.54	37.27	59	27.5	27.5
10.29	61.39	28.32	68	100.0	0.0

As can be seen from this data, if too much water is introduced into the system (i.e. sulfuric acid concentrations in water at or below about 63 weight percent) then water will be present in the corresponding vapor phase. This water cannot be separated from the HF via conventional distillation techniques. Thus, not only does Belter fail to teach or suggest a method of making anhydrous HF, it fails to suggest that any advantage is associated with the use of sulfuric acid in the range from about 65 to about 93 weight percent. Contrary to the presently claimed invention, Belter discloses that essentially any concentration of sulfuric acid can be used.

The Office cites *In re Boesch*, 205 USPQ 215 (CCPA 1980) and *In re Malagari*, 182 USPQ 549 (CCPA 1974) as standing for the proposition that a selection of a portion of a prior art range for purposes of optimization is prima facie obviousness. However, as expressly stated in MPEP 2144.05, differences in concentration may support the patentability of subject matter encompassed by the prior art, if “there is evidence indicating such concentration ... is critical.” Thus, a prima facie case of obviousness can be rebutted via a showing the criticality of the claimed range.

As demonstrated above, applicants have demonstrated that the claimed range of H_2SO_4 concentration is critical to the efficacy of the invention. That is, anhydrous HF is recoverable according to the method of the present invention if the concentration of H_2SO_4 in dilute sulfuric acid is above 63 weight percent. If the H_2SO_4 concentration in dilute sulfuric acid is below 63 weight percent, then the resulting HF- H_2SO_4 -water mixture would not yield anhydrous HF via flashing or distillation because relatively large amounts of HF will remain in the H_2SO_4 -water mixture and relatively large amounts of water will be removed along with the HF. Thus, the presently claimed H_2SO_4 concentration of from about 65 weight percent to about 93 weight percent is patentably distinct from the H_2SO_4 concentration range disclosed in Belter.

Applicants further note that, like Belter, neither Swain or Tung teach or even suggest a method of recovering anhydrous HF from HFC using dilute sulfuric acid having a H_2SO_4 concentration of from about 65 weight percent to about 93 weight. Since, according to MPEP 2142, “[t]o establish a prima facie case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all of the claim limitations”, applicants respectfully request that the Office withdraw its rejections under 103(a).

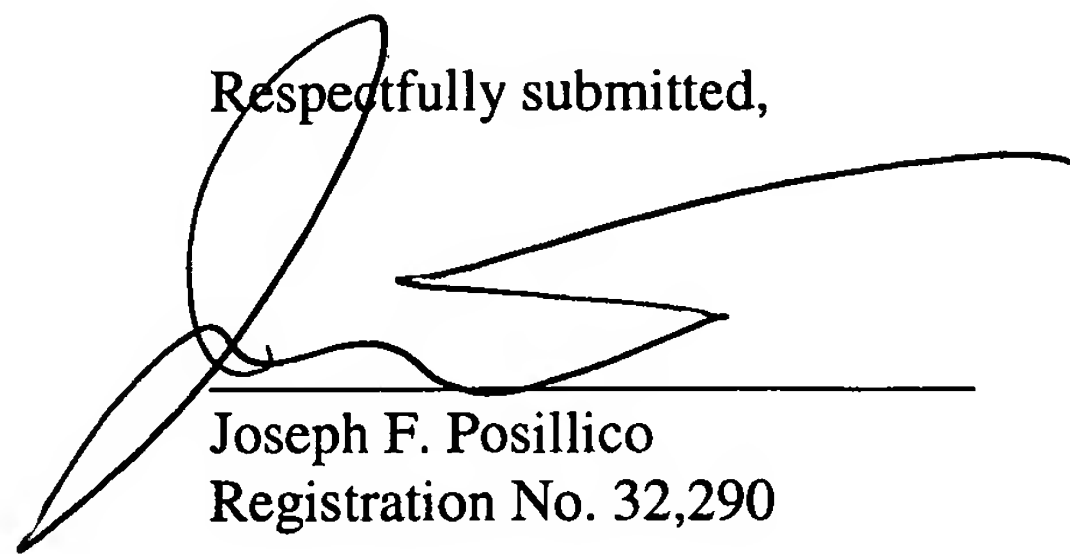
CONCLUSION:

In light of the foregoing remarks and amendments, Applicants assert that the pending claims define subject matter which is patentable over the prior art and

respectfully requests that the Office issue an indication of same at the earliest possible date. The Office is invited to contact Applicants' undersigned counsel to further the prosecution of this case in any way.

Dated: 11/21/05

Respectfully submitted,

A handwritten signature in black ink, appearing to be 'Joseph F. Posillico', written over a horizontal line.

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